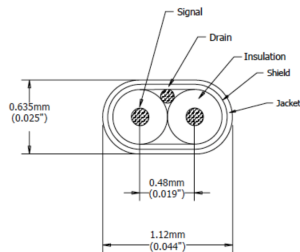
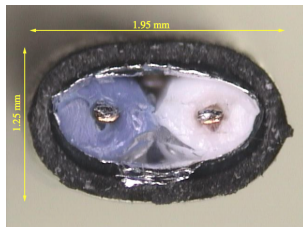


Services: Twinax Cable

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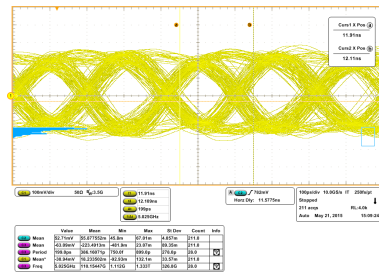


- A Twinax is a dual coaxial cable with a common shield (“Extension” of TWP).
- More material (compare to ca. 0.25 kg/km for a Cu/Kapton AWG36 TWP) but superior transmission properties.
- 3 custom prototypes were produced for R&D purposes.
- Currently Cu wire (later CCAI), low density polyethylene dielectric, Al foil shield, PU or polyester jacket.

AWG	Width/mm	Height/mm	Mass (kg/km)
28	2.39	1.32	5.2
30	1.75	0.97	2.55
34	1.12	0.64	1.1

- Used a bit error rate tester with a number of fixed rates to determine the maximum rates at which the transmission is error-free.
- The table shows the max rates in Mbps.
- The eye pattern is for 6 m of AWG 28 at 5 Gbps.
- An earlier, similar prototype was irradiated at a fluence of 10^{16} protons/cm².
- No change in transmission quality was observed.

AWG	length(m)	Raw	DC bal./preem.
28	6	3110	8000
30	6	1555	6220
34	4	1555	6220



- Since TWP cannot be used to transmit at 5 Gbps over 6 m and twinax has too much mass to be used directly on the detector a *hybrid solution* is being investigated at UCSC.
- A similar hybrid between Twinax and a Kapton flex is being investigated at the University of New Mexico.
- 1 m of twisted pair soldered directly to 6 m of twinax.
- BERT test done on the hybrid: Result for AWG 28 twinax + TWP:

8b/10b	Pre-Emph.	Raw Rate (Gbps)	Errors	BER	Run Time
✗	✗	0.622	4.57×10^4	1.93×10^{-8}	1 hour
✓	✗	2.488	0	1.46×10^{-13}	1 hour
✗	✓	3.110	0	4.50×10^{-15}	20 hours
✓	✓	6.220	0	5.67×10^{-14}	1 hour

- The design of the cables depends on the layout which has not been decided as well as on the bandwidth of the frontend chips.
- The length should be around 5-7 m.
- A current estimate of the number of cables is around 17,000.
- At present generic R&D is being done. Once the detector/FE design has been settled we can proceed to find the right solution for the electrical readout.